

Rapid Telehealth-Centered Response to COVID-19 Outbreaks in Postacute and Long-Term Care Facilities

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Abstract

Purpose: The vulnerability of postacute and long-term care (PA/LTC) facility residents to COVID-19 has manifested across the world with increasing facility outbreaks associated with high hospitalization and mortality rates. Systematic protocols to guide telehealth-centered interventions in response to COVID-19 outbreaks have yet to be delineated. This article is intended to inform PA/LTC facilities and neighboring health care partners how to collaboratively utilize telehealth-centered strategies to improve outcomes in facility outbreaks.

Methods: The University of Virginia rapidly developed a multidisciplinary telehealth-centered COVID-19 facility outbreak strategy in response to a LTC facility outbreak in which 41 (out of 48) facility residents and 7 staff members tested positive. This strategy focused on supporting the facility team remotely using rapidly deployed technologic solutions. Goals included (1) early identification of patients who need their care escalated, (2) monitoring and treating patients deemed safe to remain in the facility, (3) care coordination to facilitate bidirectional transfers between the skilled nursing facility (SNF) and hospital, and (4) daily facility needs assessment related to technology, infection control, and staff well-being. To achieve these goals, a standardized approach centered on daily multidisciplinary virtual rounds and telemedicine consultation was provided.

Results: Over a month since the outbreak began, 18 out of 48 (38%) facility residents required hospitalization and 6

(12.5%) died. Eleven facility residents have since returned back to the SNF after recovering from their hospitalization. No staff required hospitalization.

Conclusions: Interventions that reduce hospitalizations and mortality are a critical need during the COVID-19 pandemic. The mortality and hospitalization rates seen in this PA/LTC facility outbreak are significantly lower than has been documented in other facility outbreaks. Our multidisciplinary approach centered on telemedicine should be considered as other PA/LTC facilities partner with neighboring health care systems in responding to COVID-19 outbreaks. We have begun replicating these services to additional PA/LTC facilities facing COVID-19 outbreaks.

Keywords: telemedicine, telehealth, telenursing, pandemic

Introduction

The vulnerability of postacute and long-term care (PA/LTC) facility residents to COVID-19 has manifested across the world with multiple PA/LTC outbreaks associated with high mortality rates.¹ There have been >50,000 reported cases and 10,000 reported deaths due to COVID-19 in PA/LTC facilities, representing 27% of deaths due COVID-19 in the United States.² To protect PA/LTC residents from COVID-19, attention to infection control and staffing, early identification of index cases, and rapid coordinated response to outbreaks are paramount. The Center for Disease Control and Prevention has issued guidelines to support PA/LTC preparation to prevent the spread of COVID-19.³ However, there is little available guidance or standardization of best practices to align PA/LTC facilities, neighboring health systems, and health departments toward synchronized strategies for rapid response to facilities facing COVID-19 outbreaks. What follows is a description of the University of Virginia (UVA)'s COVID-19 facility outbreak strategy formed in response to COVID-19 outbreak in a rural central Virginia facility.

In April 2020, after 7 facility residents developed symptoms consistent with COVID-19, a point prevalence survey revealed that 41 (out of 48) facility residents and 7 staff members were COVID-19 positive. At the request of the facility medical

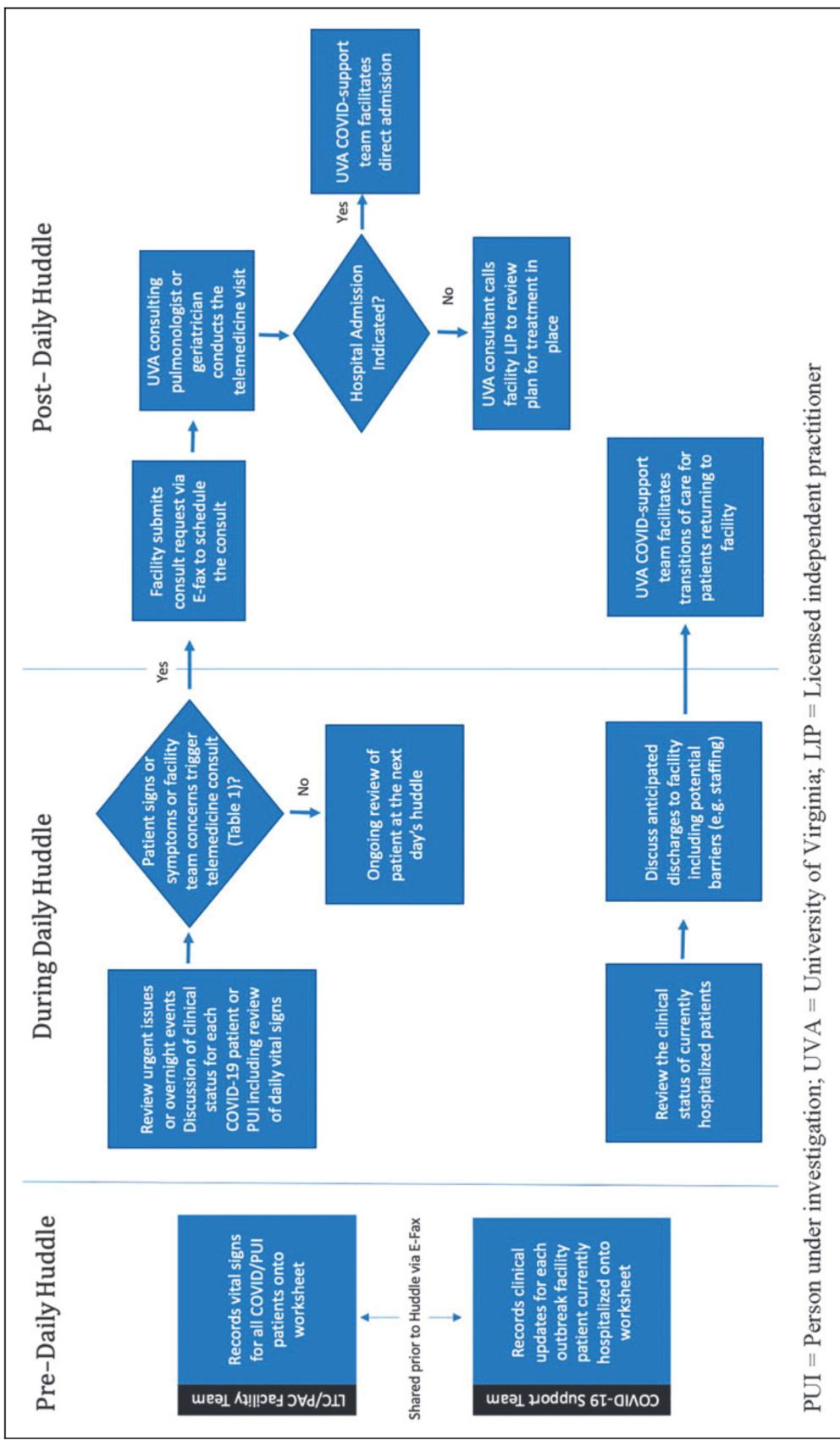


Fig. 1. Schematic of the UVA's COVID-19 facility outbreak response. LIP, licensed independent practitioner; PUI, person under investigation; UVA, University of Virginia.

PUI = Person under investigation; UVA = University of Virginia; LIP = Licensed independent practitioner

director, the UVA Medical Center was contacted to assist in the care of residents at this facility.

Approach

An interprofessional team was rapidly assembled to operationalize a response to this outbreak. The team implemented workflow changes to alleviate the administrative and clinical burden on an overworked facility staff that was struggling to sustain care after several key staff members were quarantined.

First, two UVA physicians were deployed to the facility to identify patients who needed immediate hospitalization. Simultaneously, telehealth engineers performed an assessment of the minimum standards required for mobile technologies to enable telehealth encounters in a PA/LTC facility. The minimum standards applied were ease of use by facility staff, low cost, the capacity to work in complex bandwidth environments, and the ability to integrate vital sign monitoring, a remote physical examination, and videoconferencing. Technology was assembled using readily available off the shelf equipment including an FDA-approved multifunction examination platform that integrates videoconferencing with a stethoscope, otoscope, and an oral camera along with Bluetooth-enabled vital sign monitoring. The handheld platform allows movement between units/rooms and is enabled to operate with either WiFi or cellular signal.

After the initial on-site triage of patients was completed and technology systems were deployed, subsequent goals were to provide (1) rapid identification of patients who required escalation of care, (2) standardization of care processes and monitoring for patients who are safe to remain in the facility, (3) care coordination to facilitate bidirectional transfers between the facility and the hospital, (4) clarification of goals of care and optimization of service for patients electing palliation rather than acute care transfer, and (5) daily facility needs assessment related to telehealth technology training, staffing deficit, and capacity infection control practices, and well-being of on-site staff.

The process (*Fig. 1*) whereby these goals are achieved begins with a daily “virtual huddle,” which brings together the on-site facility team as well as UVA clinical, administrative, and technological experts through joint videoconference call. During this huddle, the clinical status of each COVID-19 patient is discussed, including a review of vital signs and development/progression of any concerning symptoms. For any patient of concern (*Table 1*), if immediate hospital transfer is not indicated, a telemedicine video consultation is scheduled. The telemedicine encounters are conducted by either a UVA pulmonologist (for pulmonary or critical care concerns) or

Table 1. Clinical Signs or Symptoms That Trigger a Video Telemedicine Consultation with a University Pulmonologist for Postacute and Long-Term Care Patients Residing in a COVID-19 Outbreak Facility

SIGN OR SYMPTOM	PARAMETER
Oxygen saturation	<ul style="list-style-type: none"> • 3% or more decrease from baseline • <95% SaO₂ unless chronic hypoxia (e.g., COPD on home O₂)
Tachypnea	<ul style="list-style-type: none"> • Respiratory rate >20 • Any increased work of breathing
Tachycardia	<ul style="list-style-type: none"> • Heart rate >100 unless chronically tachycardic • Heart rate increased by 10 or more from baseline
Hypotension	<ul style="list-style-type: none"> • SBP <100 • Any decrease in SBP × 20 from baseline
Fever	<ul style="list-style-type: none"> • 38.3°C or higher
Mental status	<ul style="list-style-type: none"> • Any change in mental status, which in PA/LTC patients may be subtle including falls, decreased appetite, and increased time asleep
Gastrointestinal	<ul style="list-style-type: none"> • New onset of nausea, vomiting, or diarrhea

PA/LTC, postacute and long-term care; COPD, chronic obstructive pulmonary disease; SBP, systolic blood pressure.

geriatrician (for management of comorbid conditions and/or palliative care). For patients who warrant hospital admission, the support team coordinates direct hospital admission to bypass the emergency department. For patients who have recovered from a COVID-19 hospitalization, the support team coordinates the discharge plan with the facility staff including a review of any barriers to return to the facility (e.g., staffing levels or infection control prevention concerns).

Outcomes

Of the 48 residents at this facility, all were tested for COVID-19 with reverse transcriptase-polymerase chain reaction nasal swabs and 41 were diagnosed with COVID-19 (*Table 2*). The median age of residents was 75 years and all had multiple chronic underlying health conditions.

Over a month since the outbreak began, 13 patients (27.1%) have received telemedicine consultations including 9 who were treated in place. Plans to increase clinical monitoring, additional diagnostic testing, and specific treatment recommendations (such as prescription of antibiotics for coinfections) were implemented in those who were not admitted to the hospital.

Table 2. Characteristics and Outcomes of COVID-19 Residents at the Skilled Nursing Facility Experiencing the COVID-19 Outbreak

	TOTAL POPULATION AT TIME OF OUTBREAK	PULMONARY CONSULTS	GERIATRICS CONSULTS
No. of patients, <i>n</i> (%)	48 (100.0)	9 (18.8)	4 (8.3)
COVID-19 status, ^a <i>n</i> (%)			
Positive	41 (85.4)	9 (100.0)	3 (75.0)
Negative	6 (12.5)	0 (0.0)	0 (0.0)
Unknown ^b	1 (2.1)	0 (0.0)	1 (25.0)
Age, median (range)	75 Years (44–104)	74 Years (65–85)	85.5 Years (81–89)
Gender, <i>n</i> (%)			
Male	23 (47.9)	8 (88.9)	2 (50.0)
Female	25 (52.1)	1 (11.1)	2 (50.0)
Race, <i>n</i> (%)			
White	29 (60.4)	5 (55.6)	1 (25.0)
African American	19 (39.6)	4 (44.4)	3 (75.0)
Comorbidities, <i>n</i> (%)			
Hypertension	36 (75.0)	8 (88.9)	2 (50.0)
Dementia	33 (68.8)	5 (55.6)	4 (100.0)
Hyperlipidemia	28 (58.3)	6 (66.7)	2 (50.0)
Cerebrovascular disease	22 (45.8)	6 (66.7)	2 (50.0)
Type 2 diabetes mellitus	17 (35.4)	6 (66.7)	0 (0.0)
Reason for consult, <i>n</i> (%)			
Hypoxia/shortness of breath	–	6 (66.7)	–
Altered mental status	–	2 (22.2)	1 (25.0)
Goals of care	–	–	2 (50.0)
Malaise	–	–	1 (25.0)
Sore throat	–	1 (11.1)	–
Outcomes, <i>n</i> (%)			
Admit to hospital	18 (37.5)	4 (44.4)	0 (0.0)
Treat in PAC/LTC	30 (62.5)	5 (55.6)	4 (100.0)
Deaths, <i>n</i> (%)	6 (12.5)	0 (0.0)	1 (25.0)

^aDetermined by RT-PCR nasal swabs.^bOne patient refused testing.

RT-PCR, reverse transcriptase-polymerase chain reaction.

Six patients (12.5%) have died: five in the hospital and one on hospice at the facility. No staff member required hospitalization.

Discussion

Interventions that can effectively reduce hospitalizations and mortality are a critical need during the COVID-19 pandemic that has many intensive care units operating well above their normal capacity. The mortality rate seen in this outbreak (12.5%) is significantly lower than has been documented in other facility outbreaks (34%⁴). In addition, the hospitalization rate seen in this facility outbreak (37.5%) was significantly lower than has been described in other facility outbreaks (54%).⁴

We suspect this relatively low level of hospitalization and mortality is related to several factors, including rapid identification of patients requiring escalation of care, provision of care plans for monitoring and treatment of patients deemed safe to remain at the facility, confirmation and optimization of goals of care, and coordinated care efforts between the facility and hospital by an interprofessional team. The partnered efforts between pulmonary and geriatric specialists uniquely address a spectrum of practical concerns related to COVID-19, including not only diagnosis and treatment, but also advance care planning and disposition goals.

Conclusions

A standardized multidisciplinary approach centered on telemedicine should be considered by PA/LTC facilities facing COVID-19 outbreaks. We have demonstrated a low hospitalization and mortality rate using this approach, and begun replicating these services to additional PA/LTC facilities facing COVID-19 outbreaks.

Ethical Approval

The University of Virginia IRB deemed this program and evaluation not human subject research and not subject to IRB approval on April 23, 2020.

Authors' Contribution

All authors have made substantial contributions to the conception or design of the study and have contributed to the drafting of the article including critical revisions.

Eighteen patients (37.5%) have been transferred to the hospital, 11 of whom have already recovered and returned back to the facility. Two patients remain hospitalized, one of whom is anticipated to return to the facility this week.

Disclosure Statement

Dr. Rheuban reports serving on an advisory board for Tytocare and Locust Health. For all other authors no competing financial interests exist.

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